

## AVIATION TERMINAL FORECASTS (D-31)

6. Forecast Preparation. An NWS terminal forecast shall consist of a **concise** statement of the expected meteorological conditions significant to aviation at an airport during a specified time period. The U.S. definition of an airport is the area within 5 statute miles of the center of an airport's runway complex.

In the interest of aviation safety, NWS-prepared terminal forecasts shall also include specified critical meteorological phenomena expected to occur in the airport's vicinity (VC) during any part of the valid period. In the United States, "vicinity" is defined as an area (a donut) between circles with radii of 5 and 10 statute miles from the center of the runway complex of an airport. Refer to Section 7.2.6.a for more information regarding vicinity.

A complete aviation terminal forecast shall include a forecast of surface wind, visibility, weather and clouds (or vertical visibility into a surface-based obscuration) and any expected significant change(s) to one or more of these elements during the specified time period, which shall ordinarily be 24 hours. Under some circumstances, however, a terminal forecast may be issued for a shorter valid period. For example, if essential observational data are not available at the time of scheduled forecast preparation, a forecast issuance may be delayed, (refer to Section 8.2) resulting in a valid period of less than 24 hours.

The intent of the terminal forecast program is to provide products reflecting the forecaster's best judgement, with an awareness of the potential operational impact of each forecast element.

Automated systems are limited in the range of cloud and visibility values reported and in the weather and obscurations that they can currently report. Terminal forecasts for sites with automated systems shall contain the element value(s) and the type(s) and intensity of weather and/or obscurations that the **forecaster expects**, regardless of whether the automated system can report or differentiate between those conditions and other, similar conditions.

For example, if the forecaster expects clouds above 12,000 feet, zero visibility, ice pellets, or snow showers, the terminal forecast should reflect that. Even when an automated system reports CLR (which indicates "clear below 12,000 feet above ground level (AGL)"), M1/4SM (which indicates visibility of less than one-quarter statute mile), or rain or snow when ice pellets

or snow showers may be occurring, the terminal forecast shall be representative of what is **expected to occur**, not just what is expected to be reported by an automated system.

The forecaster shall maintain a watch of weather conditions for all pertinent terminal forecast sites, including sites with scheduled part-time observation (see Section 6.1.1), automated observing sites requiring part-time augmentation (see Section 6.1.2), and unaugmented automated observing sites (see Section 6.1.3).

Forecasters shall use the procedures detailed in this chapter and related Operations Manual Letters (OMLs) and ROMLs to prepare and maintain terminal forecasts that reflect existing or expected weather conditions as accurately and concisely as possible. Amendments (refer to Section 8.1) are an effective method of optimizing the quality of the terminal forecast service and are strongly encouraged.

Forecaster judgement shall be used to resolve situations not addressed by following the guidelines in this chapter and related OMLs and ROMLs.

Refer to Appendix C for an overview of the philosophy behind preparing terminal forecasts. In addition, Appendix D briefly summarizes the terminal forecast issuance guidelines for scheduled, amended, delayed, and suspended terminal forecasts.

6.1 Minimum Observational Requirements for Routine Terminal Forecast Issuance and Continuation. The aviation forecaster must have certain information for the preparation of each scheduled issuance of each individual terminal forecast listed in Appendices A and B. As a minimum, observations, or other complementary and/or supplementary data sources, must include the following elements:

- wind velocity (speed and direction)
- visibility
- weather and obscurations
- sky condition
- temperature
- dew point temperature
- altimeter setting

Terminal forecasts should be prepared by integrating many observed data types and sources, guidance material, and forecaster experience. The hourly and special observations are only one of the many data sources from which the elements listed

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above can be obtained. Alternative methods of obtaining the required elements should be utilized, at the discretion of the forecaster, in order to continue providing terminal forecasts. For example, if the hygrothermometer at an observing site for which a terminal forecast is prepared becomes inoperative, a sling psychrometer may be used to gather the temperature and dew point data required to continue terminal forecast service. No **single** element listed above is necessarily critical to any given terminal forecast.

**Note that all of these weather elements need not be provided completely and/or at all times in the hourly/special observation itself.** Forecasters shall also make use of supplementary, complementary and/or augmented observational data, as well as other observing systems, such as satellite, Doppler radar, profiler data, etc., in preparing and monitoring terminal forecasts. This approach, to issue and maintain terminal forecasts using multiple, integrated data sets in addition to the hourly and special observations, is known as the **total observation concept**.

Forecasters shall use the total observation concept to maintain the terminal forecast when one or more elements are missing from the METAR observation(s), as well as when an entire observation is missing. **After analyzing available data sets, if, in the forecaster's judgement, a missing observation or a missing element will have no impact on the quality of the terminal forecast, the terminal forecast shall be issued and continued.** Conversely, in the event the forecaster believes the absence of an observed element(s) will lead to a degradation of the quality of the forecast, the forecast shall be limited (e.g., NIL AMD, indicating no amendments will be provided) or suspended (NIL).

Once a particular terminal forecast has been suspended (NIL), a delayed or scheduled terminal forecast for that airport shall not be issued until two consecutive observations not less than 30 minutes nor more than one hour apart have been received, in order to establish a trend. The two observations must be consecutive and must be not less than 30 minutes nor more than one hour apart. The observations can be two consecutive hourly observations or any two or more observations over approximately a half-hour interval (hourly and special or two specials). This is a daily requirement for sites with part-time manual, or part-time augmented automated, observations.

6.1.1 Sites With Scheduled Part-Time Observations. For terminal forecasts with less than 24-hour observational coverage, or for which part-time terminal forecasts are provided, the terminal forecast shall be valid to the end of the routine scheduled forecast period even if observations have ceased prior to that time. The time observations are scheduled to end and/or resume shall be indicated by expanding the "AMD NOT SKED" statement. Expanded statements shall include the observation ending time (AFT \_\_Z), the scheduled observation resumption time (TIL \_\_Z) or the period of observation unavailability (\_\_Z-\_\_Z). "TIL" should be used only when the beginning of the scheduled terminal forecast valid period coincides with the time of the last observation or when observations are scheduled to resume prior to the next scheduled issuance time. The period should be stated if known and judged reliable. When used, these phrases shall immediately follow the last forecast group. If a routine forecast issuance is scheduled to be made after observations have ceased, but before observations are resumed, the contraction "NIL" followed by the end of report separator shall immediately follow the valid period group of the scheduled issuance. After two consecutive observations have been received, giving the forecaster a reasonable indication of the meteorological trend, and the forecaster judges that the terminal forecast can be resumed based on availability of all the required elements using the total observation concept (see Section 6.1), a delayed forecast shall be prepared and transmitted. The delayed forecast shall be identified in the abbreviated WMO header by the indicator "RRx" (where x = A-X) (see Sections 7.1 and 8.2).

Examples:

TAF AMD  
KACV 141410Z 141412 text NIL=

TAF AMD  
KRWF 150202Z 150224 text AMD NOT SKED 05Z-18Z=

TAF AMD  
KPSP 190230Z 190324 text  
NIL AMD=

TAF  
KRWI 141610Z 141612 NIL=

6.1.2 Automated Observing Sites Requiring Part-Time Augmentation. Each NWS office with terminal forecast responsibility should acquire and maintain a current copy of the FAA document 7900.5A, Surface Weather Observing - METAR. Chapter 4 of that document is entitled "General Procedures at Automated Weather Stations" and Chapter 5 is entitled

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"Augmentation at Automated Weather Stations".

Terminal forecasts for **non-ASOS** automated observing sites which have part-time augmentation, shall be prepared using the procedures for part-time manual observation sites detailed in Section 6.1.1, with one exception. This exception is the remark to be used when the automated system is unattended. Specifically, the time that an augmented automated system is scheduled to go into unattended operation and/or the time augmentation will resume shall be included in a remark unique to automated observing sites: "AMD LTD TO CLD VIS AND WIND (AFT aaZ, or TIL bbZ, or aaZ-bbZ)", where "aaZ" is the time of the last augmented observation and "bbZ" is the time the second complete observation is expected to be received. This remark, which does not preclude amendments for other forecast elements, shall be appended to the last scheduled terminal forecast issued prior to the last augmented observation. It shall also be appended to all subsequent amendments until augmentation resumes.

The "AMD LTD TO (elements specified)" remark is a flag for customers and differs from the "AMD NOT SKED AFT \_\_Z" remark for part-time manual observation sites. "AMD LTD TO (elements specified)" means that customers should not expect amendments due to changes in the thunderstorm forecast elements or the freezing/frozen precipitation elements (for example) after the specified time. It also means that some reliable information is available and will be used to support terminal forecast services.

### Example:

TAF AMD  
KCOE 150202Z 150224 text AMD LTD TO CLD VIS AND WIND  
05Z-18Z=

Amended TAF for Coeur D'Alene Air Terminal, issued on the 15th day of the month at 0202 UTC. It amends a previous terminal forecast valid from 0000 UTC on the 15th until 0000 UTC on the next day (the 16th). The amended forecast indicates that, between 0500 and 1800 UTC, amendments will only be issued for wind, visibility, and clouds.

**Non-ASOS** automated systems with part-time augmentation, which the forecaster suspects are providing unreliable information when unaugmented, should be reported for maintenance and treated the same as part-time manual observation sites (see Section 6.1.1). In such cases, the "AMD NOT SKED AFT \_\_Z" remark shall be used.

When an amendment is necessary, it shall include forecasts for all appropriate terminal forecast elements, including those not reported when the associated automated observation is unaugmented. Forecasters should use their best judgement and all

available information to determine unreported elements such as present weather. If unreported elements are judged crucial to the representativeness of a terminal forecast and cannot be adequately determined (e.g., fog versus moderate snow), the terminal forecast should be suspended (i.e. issue an amended terminal forecast stating "NIL").

6.1.3 Unaugmented Automated Observing Sites. The terminal forecast issued for an **unaugmented ASOS** site may be suspended in the event the forecaster is notified of, or strongly suspects, an outage. Forecasters may also consider suspension of terminal forecast service when an element the forecaster judges to be critical is missing from the observation and cannot be obtained using the total observation concept. The term "NIL AMD", indicating no amendments will be provided, shall be appended, on a separate line and indented five spaces, to the end of an amendment to the existing terminal forecast when appropriate. If the outage occurs within one hour of the next scheduled issuance or if the forecaster begins to suspect that the existing terminal forecast is unrepresentative of conditions, an amendment or scheduled issuance containing only the statement "NIL" shall be issued.

6.2 Guidance and Coordination. Forecasters should utilize available guidance products from the National Centers for Environmental Prediction (NCEP), the Aviation Weather Center (AWC), the Alaska Aviation Weather Unit (AAWU), the Storm Prediction Center (SPC), the Tropical Prediction Center, the Central Pacific Hurricane Center, the Techniques Development Laboratory, and other sources, as appropriate. However, the detail demanded in the terminal forecast and the influence of local effects require the use of the forecaster's judgement, experience, and expertise to prepare this highly definitive mesoscale forecast. **The forecaster is the final authority, and is ultimately responsible for the forecasts he or she issues.**

Forecasters should coordinate with adjacent NWS offices to prevent inconsistencies between forecasts. Terminal forecasts should be synoptically consistent with public and other aviation products. However, since the terminal forecast describes conditions in a very small area, as compared to public zone forecasts or sections of an aviation area forecast, some small-scale differences may occur. Routine coordination procedures should ensure that public and aviation forecasts issued by adjacent offices are synoptically consistent. MICs are ultimately responsible for ensuring consistent, accurate, well-written forecasts.

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When appropriate, NWS offices should call local FAA facilities and/or Center Weather Service Units (CWSU) to solicit pilot reports (PIREPs). PIREPs provide additional information on operationally significant ceilings, non-convective low-level wind shear, etc. CWSU forecasters should relay PIREPs of conditions pertinent to the terminal forecast, as well as other PIREP information as duties permit, to appropriate NWS offices.

6.3 Time References. The times in terminal forecasts shall be stated in Coordinated Universal Time (UTC). Time references should be as detailed and specific as supporting data and forecaster knowledge allow. The letter "Z" is appended to the end of the date-time group of forecast origin (refer to Section 7.2.2). The contraction UTC does not appear in the WMO abbreviated heading (see Section 7.1) nor the forecast text (see Section 7.2).

6.4 Contractions. The only contractions to be used in NWS terminal forecasts shall be those terms defined in this manual chapter, which have been derived from the WMO Codes Manual and from the ICAO document "ICAO Abbreviations and Codes". In a very few cases, plain language English terms may be used. All valid contractions applicable to terminal forecasts are included in Appendix E.

6.5 Dissemination and Format. All scheduled and unscheduled terminal forecasts shall be disseminated via long-line circuits. Terminal forecasts prepared by NWS offices in the contiguous United States (CONUS) and Puerto Rico are transmitted internally on NWS communication systems such as Automation of Field Operations and Services (AFOS) as individual products, i.e., one terminal forecast per communication header. The NWS Telecommunication Gateway (NWSTG), which is responsible for the domestic and international distribution of terminal forecasts, assembles all terminal forecasts prepared by NWS offices in the CONUS and Puerto Rico into collectives for domestic and international distribution. Terminal forecasts prepared by NWS offices in Alaska and Pacific Regions are transmitted to the NWSTG in collectives, i.e., several forecasts per communication header. Individual NWS offices shall conform to the regulations of the NWS region managing the network on which the forecasts originate (i.e., AFOS, Alaska Region Operations Network [ARONET], etc.).

The first line of the text of a terminal forecast product shall consist solely of "TAF" or "TAF AMD" (see Section 7.2). The contraction TAF (or TAF AMD) is stated only once in each product, whether it contains one or more terminal forecasts. The next

line begins with the ICAO 4-letter location identifier at the left margin. Any subsequent FMGGgg group(s) (refer to Section 7.2.9.a) shall begin on a new line(s), indented **five** spaces. Continuation line(s) of a forecast group shall be indented **six** spaces.

When an office transmits more than one terminal forecast in a single collective, each forecast shall be started on the line immediately following the previous terminal forecast with the location identifier at the left margin. Each complete terminal forecast shall be followed by an end-of-report separator (an equal sign [=]) to denote the end of a complete terminal forecast for each location. The end-of-report separator shall be followed by two carriage returns and a line feed.

The **length of a line shall not exceed 69 spaces**, including typed characters, spaces, carriage returns, line feeds, and the end-of-report separator.

6.6 Issuance Times. Scheduled terminal forecasts prepared by NWS offices are issued four times a day, every six hours, according to the following schedule:

SCHEDULED ISSUANCE	VALID PERIOD	ISSUANCE WINDOW
0000 UTC	0000 to 0000 UTC	2320 to 2340 UTC
0600 UTC	0600 to 0600 UTC	0520 to 0540 UTC
1200 UTC	1200 to 1200 UTC	1120 to 1140 UTC
1800 UTC	1800 to 1800 UTC	1720 to 1740 UTC

A **scheduled** terminal forecast is always issued prior to the beginning of the valid period of the forecast. Routine terminal forecast issuances should be completed by the forecaster and transmitted 20 to 40 minutes before the beginning of the forecast valid period, e.g., no later than 0540 UTC for a terminal forecast valid from 0600 to 0600 UTC. Forecasters are encouraged to transmit terminal forecasts at the beginning of the issuance window whenever possible, to facilitate timely delivery of the forecasts to our customers and to ease communication loading at the end of the issuance window.

Each office with terminal forecast responsibility is required to issue four scheduled terminal forecasts per day, even if one (or more) of the scheduled terminal forecasts are suspended ("NIL").



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Following a "NIL" terminal forecast, a delayed forecast (see Section 8.2) or scheduled forecast shall be issued as soon as possible, based on forecaster judgement.

6.7 Sub-dividing the Terminal Forecast Valid Time Period. The valid time period of the terminal forecast may be sub-divided into one or more smaller segments of time to describe significant changes to the forecast conditions during the period. The terms used to sub-divide the valid time period are described in Section 7.2.9.

Terminal forecasts should be as simple and straightforward as possible. Changes indicated in the forecast should be kept to the minimum number needed to describe operationally significant changes. Weather conditions and elements to be considered **significant** in decisions regarding sub-dividing the forecast valid period and the utility for forecast amendments include the following:

6.7.1 Flight Category Changes. The Low Instrument Flight Rules (LIFR), Instrument Flight Rules (IFR), Marginal Visual Flight Rules (MVFR), and Visual Flight Rules (VFR) flight categories define sets of operating procedures, aviator qualifications and aircraft capability requirements. Forecasters shall be familiar with these flight categories. Changes or expected changes in ceiling and/or visibility that cross a flight category threshold are operationally significant. Changes in these flight categories could mean a flight cancellation or could necessitate carrying extra fuel.

The flight categories and corresponding ceiling and visibility values are listed below.

FLIGHT CATEGORY	CEILING (feet)		VISIBILITY (statute miles)
LIFR	< 500 ft	and/or	< 1SM
IFR	≥ 500 to < 1,000	and/or	≥ 1 to < 3SM
MVFR	≥ 1,000 to ≤ 3,000	and/or	≥ 3 to ≤ 5SM
VFR	> 3,000 ft or none	and	> 5SM

NOTE: IFR is alternatively defined as including LIFR meteorological conditions.

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6.7.2 Element Value Changes. Other element thresholds and/or events that have operational impact, i.e., significant safety, capacity, and/or efficiency impact on aviation operations, include:

## CEILING AND/OR VISIBILITY THRESHOLDS WITHIN A FLIGHT CATEGORY:

CEILING AND/OR VISIBILITY THRESHOLDS	OPERATIONAL IMPACT
< 2,000 ft and/or < 3 mi	Alternate destination and increased fuel required for IFR planning. May restrict visual approaches reducing airport arrival rates.
< 800 ft and/or < 2 miles	Non-precision-approach airports cannot be used as an IFR flight planning alternate.
< 600 ft and/or < 2 miles	Airport cannot be used by most operators as an IFR flight planning alternate.
< 200 ft and/or < 1/2 mi	These forecast conditions would preclude dispatch/release to the airport as a destination or alternate for most operators. Operators approved for approach Category II/III could dispatch as a destination airport.

## EVENTS THAT HAVE SIGNIFICANT OPERATIONAL IMPACT:

Onset or ending of:	thunderstorms, non-convective low-level wind shear, freezing precipitation, ice pellets, moderate or greater rain, snow expected to accumulate, or sustained winds greater than 15 knots
Occurrence of:	wind direction changes of 30 degrees or more when speeds are 12 knots or more or wind gust value changes of 10 knots or more